Fury Interface Board

Pre-Release User Manual

10/28/2007

The following pages describe the Fury I/O interface board (IB).

Note: In this pre-release document, only the general description of each schematic will be included. The Production board will have the complete specs.

Page 1, is the layout and multiplexing of the input from the EFC and 10MHz signals. These are provided by the Fury board.

Here we see the connections for the 3 different OCXO's supported.

J14, J15, J16 and J17 are all SMA connectors.

J14 is the SMA connector to the Fury EFC. J15 can be used to sample the signal and TP1 is the test point for a possible oscilloscope or DVM.

J16 is the SMA connector to the Fury 10MHz signal. J17 can be used to sample the signal and TP2 is the test point for a possible oscilloscope or DVM.

The connector, for the HP10544A and the 10811-xxxx OCXO's, is labeled U3.
HP OCXO's require +24V and +12V to function properly.

The other connection is for the 4 pin, 36x27mm type of OCXO. Many different manufacturers provide this kind of footprint. MTI and Crystek are just a few.

If the OCXO you are using is none of the above, then you can either connect straight from the Fury or connect from the Fury to the IB and use the SMA breakouts (J15, J17) from there. This will reduce the wear on the Fury SMA connectors.

Note that only one OCXO can be connected at any time.

Page 2, describes the circuit to drive the EFC voltage for the different oscillators.
The Fury EFC output swings between 0-5VDC. In order to properly interface with OCXO's, with different EFC range, a simple OPAMP circuit is needed.

Care must be taken to select the right kind of OPAMP. Some considerations should be offset drift and noise parameters.

We picked the LT1208 because we have been very pleased with the device in the past.

Note, that any 8 pin, dual OPAMP should fit, as the pinouts are similar for most industry devices.

Description of the circuit:

U1A and associated components perform input voltage translation between 0-5V and +/-10V. U2 (TL431) is used as the voltage reference. By changing R1,R2 and R5,R6, different voltage offsets can be achieved. Make sure that R1=R5 and R2=R6.

U1B and associated components perform input voltage translation between 0-5V and 0-10V. By changing R8,R9 and R10,R11, different voltage offsets can be achieved. Make sure that R8=R11 and R9=R10.

The input from the Fury board can be switched, (via J8, J9 and J10) to the different parts of the circuit. Only one of these jumpers should be connected at any time.

(J8, J11), (J9, J12) and (J10, J13) should be connected in pairs.

If J8 is not connected then J21 should be, in order to ground the input of U1A.

If J10 is not connected then J23 should be, in order to ground the input of U1B.

Page 3, Describes the GPS antenna, 10MHz output and 1PPS output connections.

The Fury normally provides a cable with a MMCX to female BNC connectors. This cable is connected to the GPS receiver antenna input.

We prefer to use a MMCX to SMA antenna cable and have the female BNC connector on the IB. This way, all the connectors are situated on the two boards.

Basically, what we have done here is provide an alternate way to connect the GPS antenna.

If you prefer to use the MMCX to BNC cable, then you can still use the IB and attach the cable to, J3. J3 is a board mounted male BNC connector. This way you can still have all the connectors on the two boards.

J5 is a board mounted BNC connector, which provides that 10MHz signal, from the Fury.

J7 is a board mounted BNC connector, which provides that 1PPS signal, from the Fury.

Page 4, Describes the power supply.

The following options are available:

Option 1. HP OCXO is used, +/- 24VDC is provided.

In this case you should build the entire schematic.

Option 2. HP OCXO is used, +/- 24VDC and +/- 12VDC are provided.

In this case build everything except the two voltage regulators.

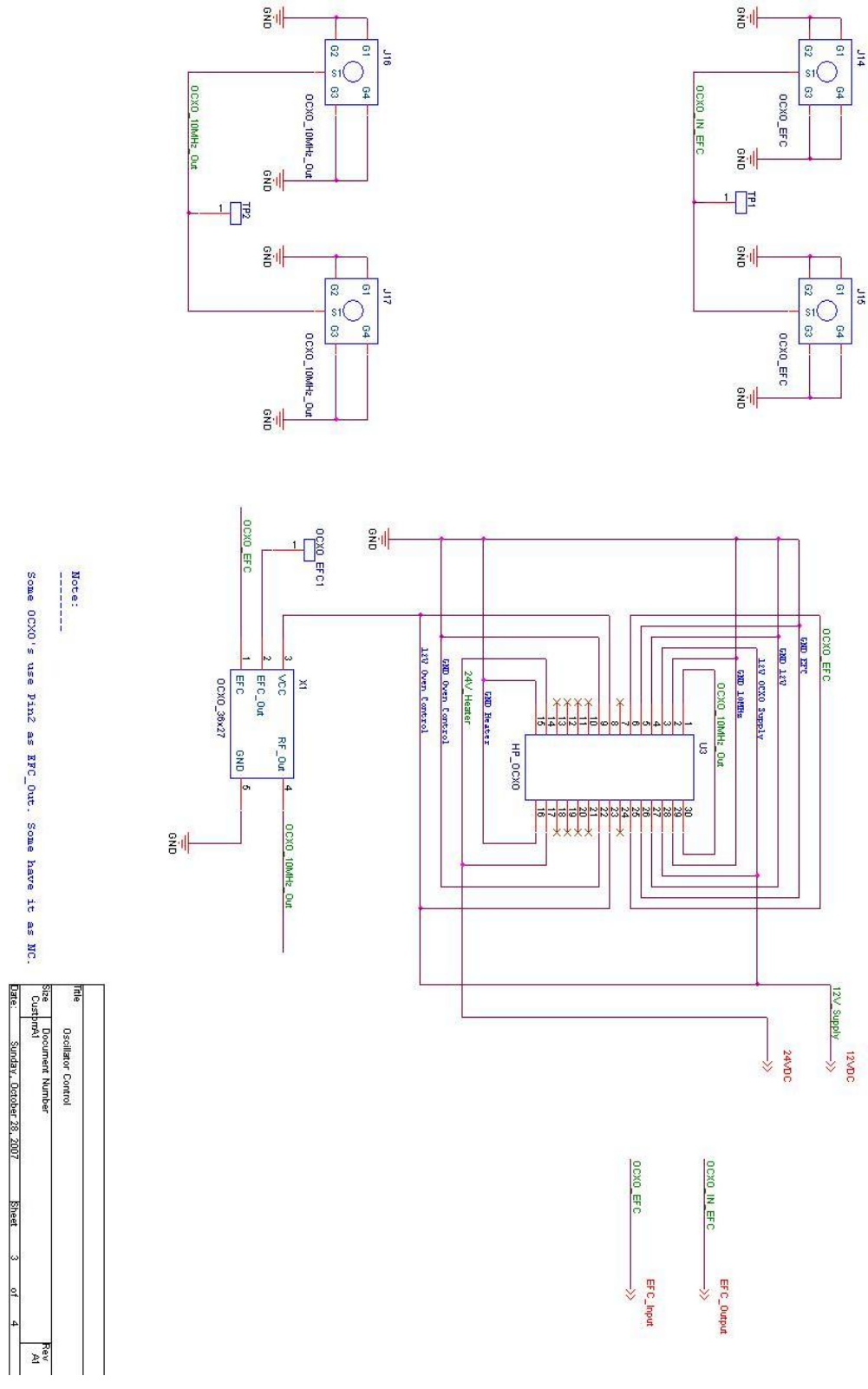
Option 3, Non-HP OCXO is used. In this case just provide the +/-12VDC and build everything after the voltage regulators. This includes: C7, C8, D1, C13, C14 and D2.

Optionally, you can build the power indicator circuit.

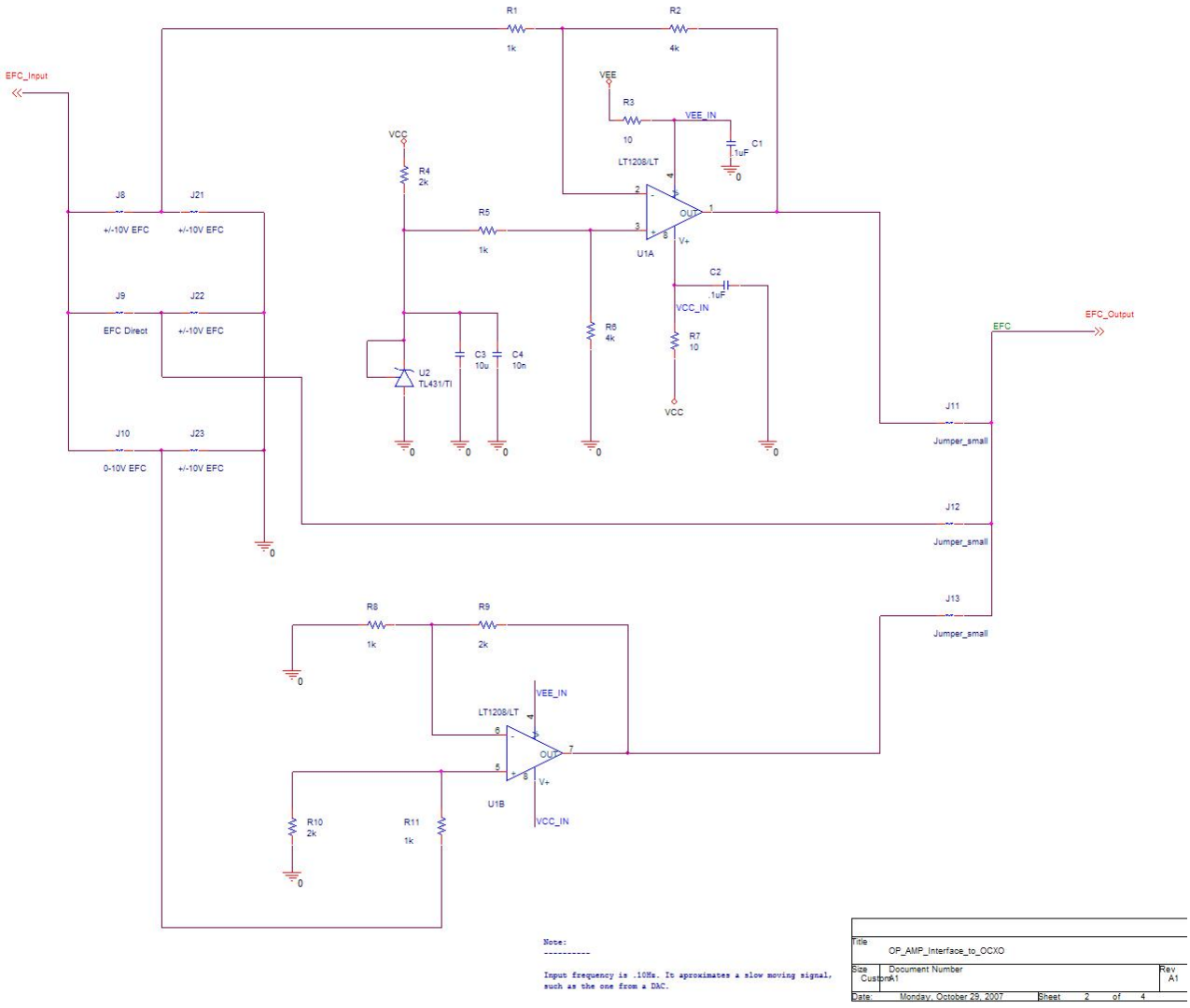
Page 5, is the circuit used to do the PSPICE modeling of the OPAMP EFC interface.

Page 6, is the PSPICE output of the circuit on page 5.

Page 1:


J14
J15
J16
J17
TP1
TP2
OCXO_EFC1
X1
OCXO_30x27
HP_OCXO
U3
OCXO_EFC
OCXO_IN_EFC
OCXO_10MHz_Out
12V_Supply
24VDC
12VDC
EFC_Output
EFC_Input
GND
Note:
Some OCXO's use Pin2 as EFC_Out. Some have it as NC.
Title
Oscillator Control
Document Number
Rev
A1
Size
CustomA1
Date:
Sunday, October 28, 2007
Sheet
3
of
4

Page 2:



Note:

Input frequency is .10Hz. It aproximates a slow moving signal, such as the one from a DAC.

Title	OP_AMP_Interface_to_OCXO	
Size: Custom	Document Number: A1	Rev: A1
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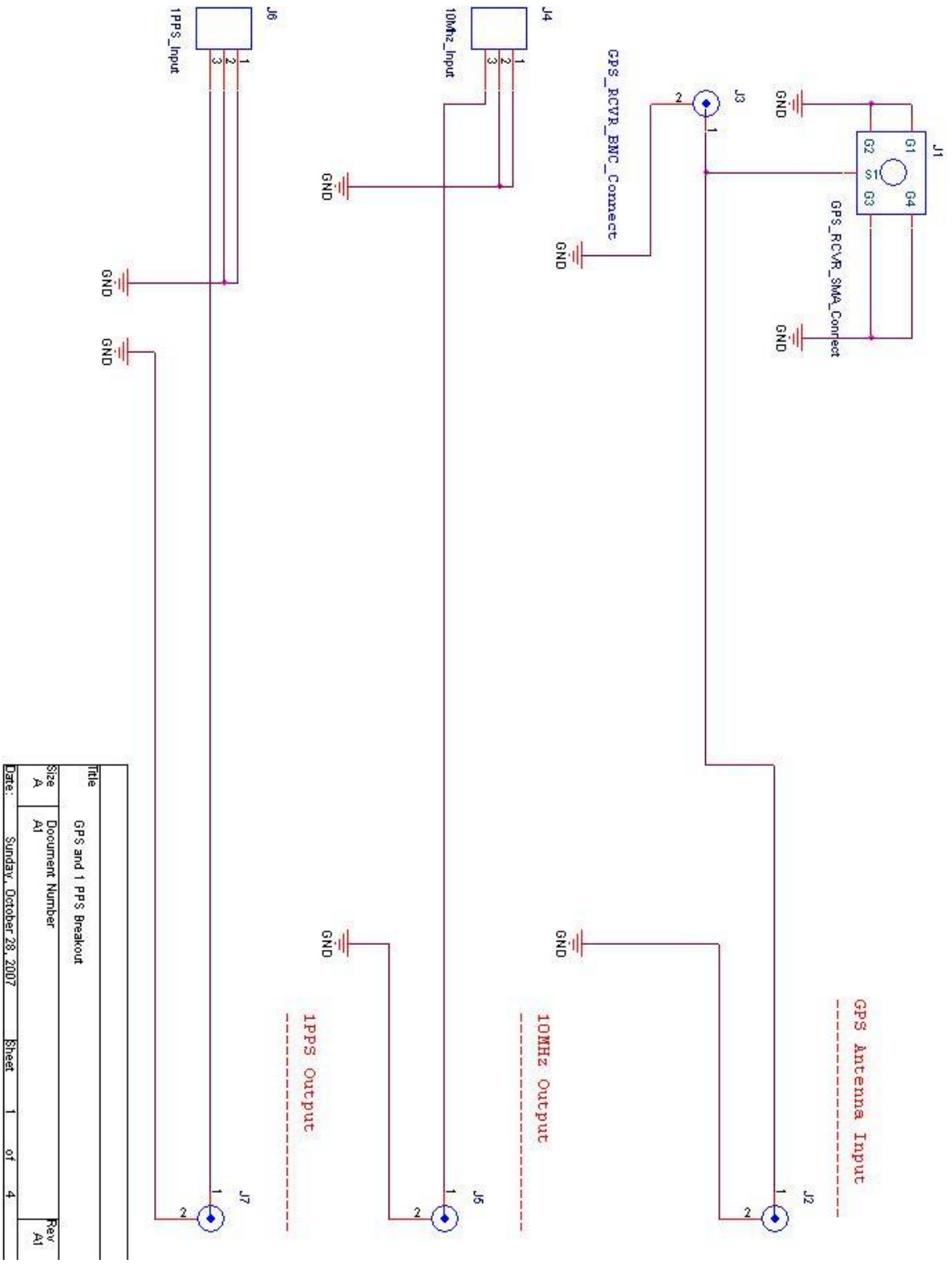
Page 3:


J1
G1
G2
S1
G3
G4
GPS_RCVR_SMA_Connect
GND
J3
GPS_RCVR_BNC_Connect
GND
J4
10MHz_Input
GND
J6
1PPS_Input
GND
GND
GPS Antenna Input
J2
GND
10MHz Output
J5
GND
1PPS Output
J7
GND
Title
GPS and 1 PPS Breakout
Size
A
Document Number
A1
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A1
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1
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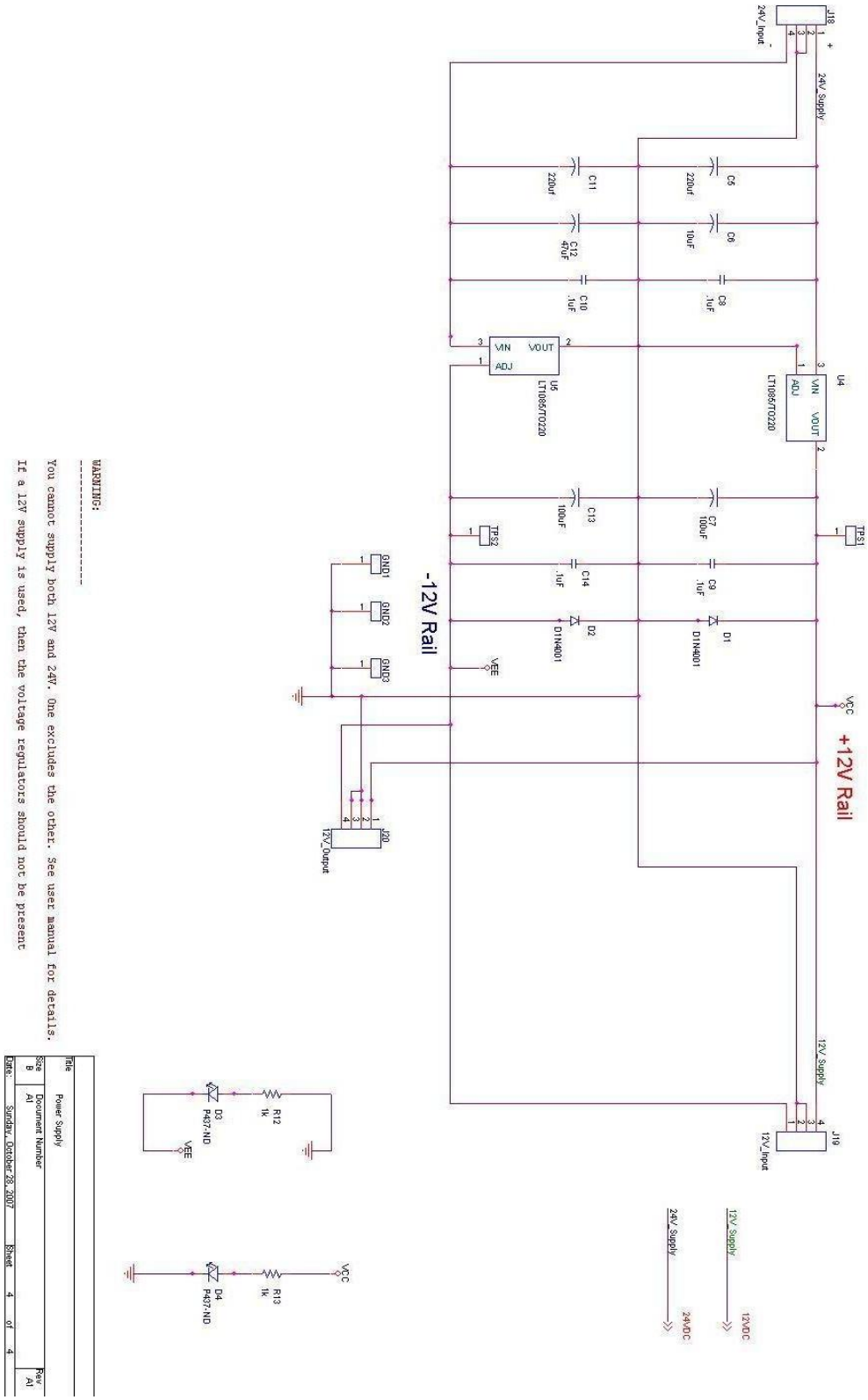
Page 4:


J18
24V_Input
24V_Supply
C11
220uf
C5
220uf
C12
47uF
C6
10uF
C10
.1uF
C8
.1uF
U6
LT1085/TO220
VIN
VOUT
ADJ
U4
LT1085/TO220
C13
100uF
C7
100uF
TP52
TP51
C14
.1uF
C9
.1uF
D2
D1N4001
D1
D1N4001
GND1
GND2
GND3
VEE
VCC
-12V Rail
+12V Rail
J20
12V_Output
J19
12V_Input
12V_Supply
24V_Supply
12VDC
24VDC
R12
1k
D3
P437-ND
R13
1k
D4
P437-ND
WARNING:
You cannot supply both 12V and 24V. One excludes the other. See user manual for details.
If a 12V supply is used, then the voltage regulators should not be present
Title
Power Supply
Size
B
Document Number
A1
Rev
A1
Date:
Sunday, October 28, 2007
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4
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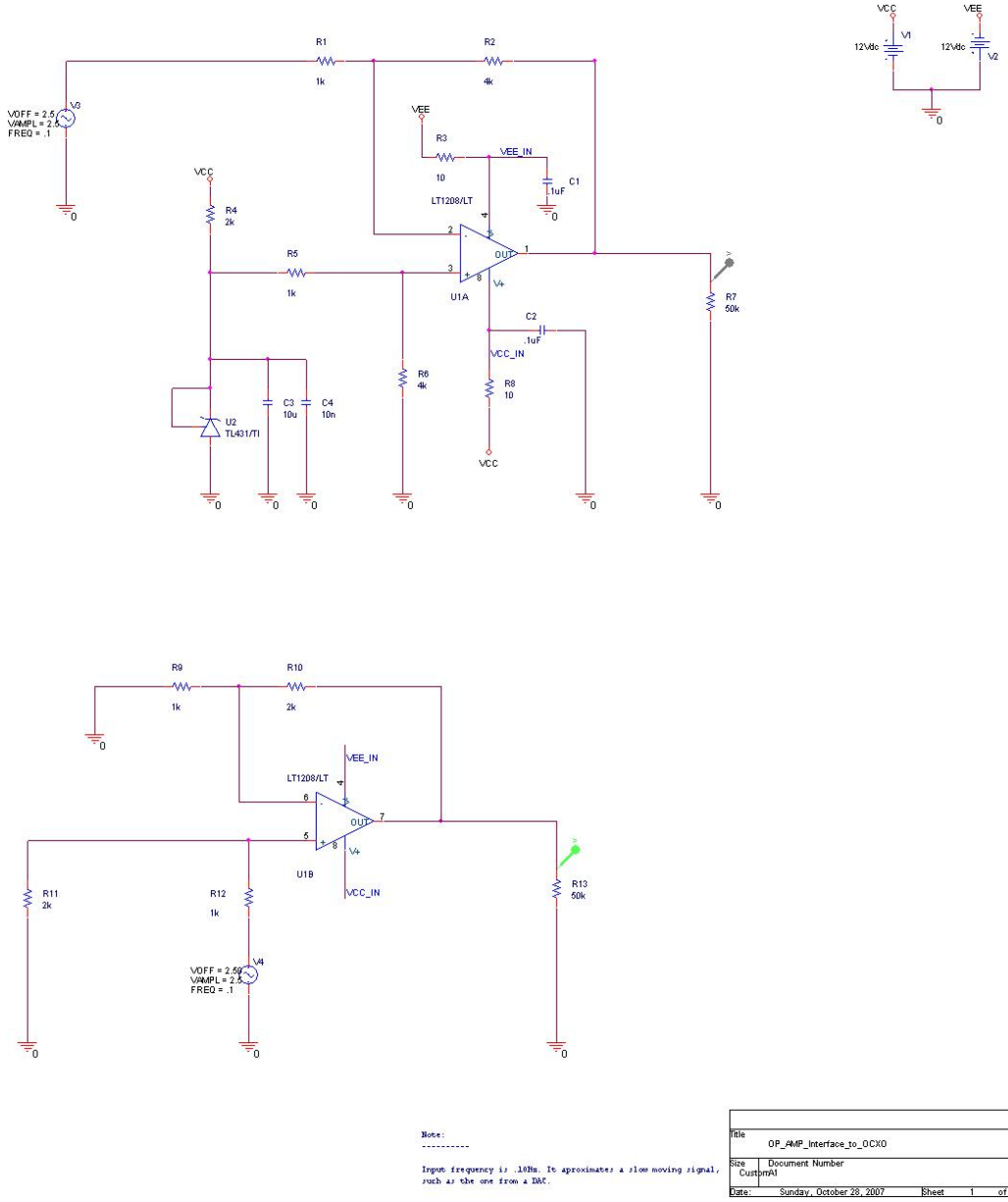
4

Page 5:

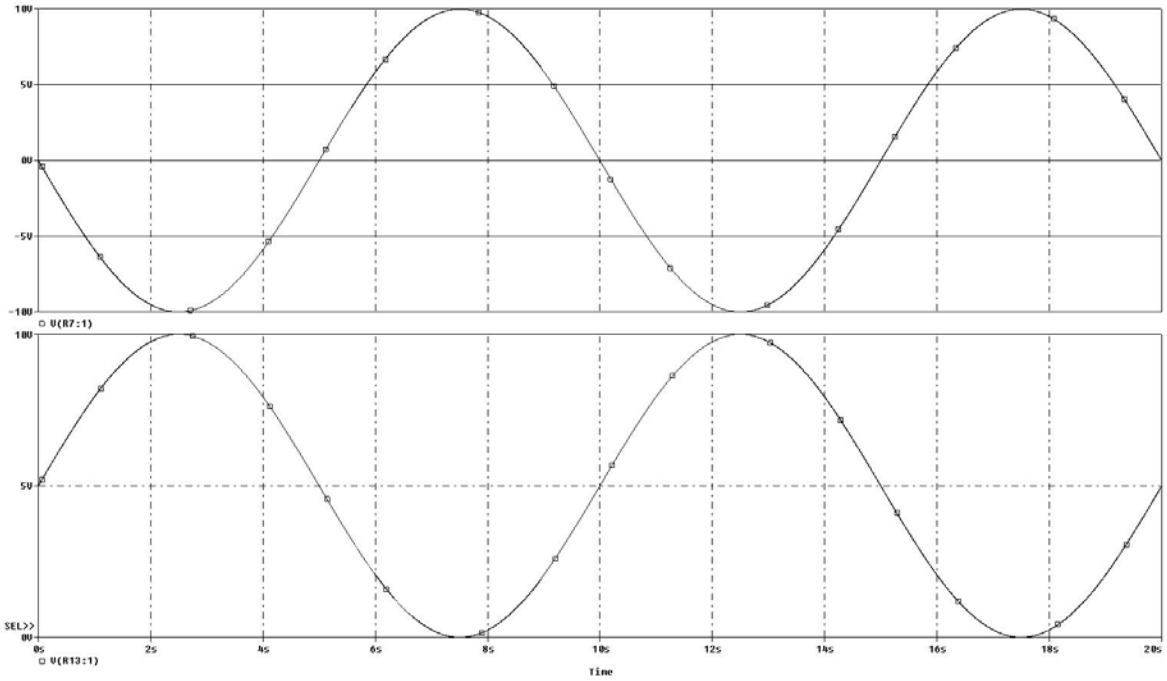


Note:

Input frequency is .10Hz. Its aproximates a slow moving signal, such as the one from a DAC.

Title: OP_AMP_Interface_to_OCXO			
Size: Custom	Document Number: A1		Rev:
Date: Sunday, October 28, 2007	Sheet 1 of 1		

Page 6:


10V
5V
0V
-5V
-10V
V(R7:1)
10V
5V
SEL>>
0V
V(R13:1)
0s
2s
4s
6s
8s
10s
12s
14s
16s
18s
20s
Time